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ABSTRACT

Instructional materials development in agricultural education is part of the role of the faculty in the Agricultural Education Program Area at Virginia Polytechnic Institute and State University. The bases for instructional materials development must relate to the curriculum. Curriculum development is a moving circular process involving horizontal and vertical articulation-diffusion of materials between educational programs. Beginning in the 1920's and continuing until the present date, the materials produced have been widely used. An eight-step procedure is used in materials development: (1) determination of material needed, (2) preliminary planning, (3) information acquisition and analysis, (4) preparation of first draft, (5) refinement and field testing, (6) printing, (7) distribution-diffusion, and (8) appraisal and updating. Materials development is an integral activity and responsibility of the faculty involving three major interrelated functions: service, research, and instruction. The faculty has access to numerous supportive services in instructional materials development and participates in supportive associations. Appended are: staffing list of the Agricultural Education Faculty, a seven-page list of recent instructional materials development activities (titles and brief annotations of 79 items), and a two-page bibliography. (Author/MS)

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INSTRUCTIONAL MATERIALS DEVELOPMENT

IN

AGRICULTURAL EDUCATION

AT

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Theoretical and practical bases, past efforts,
and current structure for materials development activities

U S DEPARTMENT OF HEALTH,
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Preface

Instructional materials development in agricultural education has been conducted in a variety of settings. The first efforts in nearly all states were initiated by the personnel employed specifically for the purpose of training teachers. These efforts were usually at a land-grant college and under the auspices of a department of agricultural education. The need for increased numbers of materials was obvious to the early leaders in agricultural education and continues to be an area of concern.

Considerable attention has been given to curricular matters in vocational education and agricultural education in recent years. This trend prompted the author to analyze the role of the faculty in the Agricultural Education Program Area at Virginia Polytechnic Institute and State University in curriculum and instructional materials development. The paper presented here is a result of this analysis and was developed largely through a review of the literature, peer input, and introspection. It is intended to serve as a benchmark for future instructional materials development activities as well as to clarify the role and procedures in materials development.

This document is also prepared to inform the consumers of the instructional materials developed (primarily agricultural teachers in the State of Virginia) of the rationale behind materials development and the procedures followed in such development. Through such a knowledge, it is hoped that more efficient use can be made of these materials.

Acknowledgement

The document presented here is the result of considerable professional involvement by the author and a number of professional colleagues. This association spans several years and includes persons in Virginia and several other states. A few of these persons are mentioned below.

James P. Clouse, Program Leader, Agricultural Education, Virginia Polytechnic Institute and State University

Larry E. Miller, Assistant Professor, Agricultural Education, Virginia Polytechnic Institute and State University

John Crunkilton, Associate Professor, Agricultural Education, Virginia Polytechnic Institute and State University

Martin B. McMillion, Associate Professor, Agricultural Education, Virginia Polytechnic Institute and State University

Dewey Adams, Director, Division of Vocational and Technical Education, Virginia Polytechnic Institute and State University

Acknowledgement is also given to personnel with the State Department of Education, Vocational Education Division, for the support of instructional materials development for Agricultural Education in the State of Virginia. Mr. Julian Campbell, State Supervisor of Agricultural Education, is to receive special acknowledgement for his support and assistance.

Instructional materials development has been and currently is a distinct function of the faculty in the Agricultural Education Program Area at Virginia Polytechnic Institute and State University. The performance of this function has been characterized by widely different approaches and varying end products. In this document, the term "instructional materials" is used in a broad sense to describe various materials produced for use by high school teachers of agricultural education and often referred to as curriculum guides and reference units. The purpose of this paper is (1) to examine the theoretical and practical bases for instructional materials development in agricultural education, (2) to review past instructional materials development efforts, and (3) to examine alternatives for expanding the instructional materials development function as an integral activity of the faculty in the Agricultural Education Program Area.

Bases for Instructional Materials Development in Agricultural Education

The bases for any instructional materials development effort must be rooted in the curriculum; that is, instructional materials development activities further delineate the curriculum. Numerous attempts have been made to explicitly define "curriculum." In general, these definitions are stated in broad, all-encompassing terms. Johnson (1968:1) defined curriculum as "The sum of the experiences that students have under the direction of the school and school personnel . . ." Smith, Stanley, and Shores (1957:3) described the curriculum as "a sequence of potential experiences . . . set up by the school for the purpose of disciplining children and youth in group ways of thinking and acting." Curriculum has also been defined by Barlow (1969:6) as ". . . the sum of the experiences that a student has under the guidance of the school."

Any of the above definitions would appear acceptable as the theoretical starting point from which instructional materials development could be carried out in agricultural education. However, none were developed specifically for agricultural education. Several key words in each definition are very applicable to agricultural education. First, the word "experiences" is mentioned in all three definitions. This is a relevant term for agricultural education which has largely been an experiential educational entity based on "learning by doing." Secondly, all three definitions, in less precise terms, iterate that the experiences are "under the direction of the school," "set up by the school," and "under guidance of the school." It would appear that any further attempt to define curriculum must include "experiences" and "under direction of the school."

Within the overall curriculum of a school, there may be various curricular components which provide experiences for particular purposes, such as the agricultural education program in a comprehensive high school or vocational education center. The experiences and learning activities in agricultural education comprise the agricultural education curriculum. The agricultural education curriculum often manifests itself in the forms of curriculum outlines, courses of study, audiovisual materials, classroom and laboratory facilities, and equipment and supplies. The teacher is, of course, very definitely a manifestation of the agricultural education curriculum. However, it can be said that these manifestations are fragmentary evidences of the existence of a curriculum and do not in and of themselves comprise the curriculum.

Curriculum is not static, but is dynamic and characterized as ever-changing. Recent years have seen many modifications in past curriculum practices in the public schools. Agricultural education has expanded to include a broad range of occupations in agribusiness, agricultural mechanics, natural resources, ornamental horticulture, forestry, and environmental protection. The emergence of career education has brought about significant changes in the curricula of many schools.

Curriculum changes must also be related to the increased emphasis by educational practitioners on curricular matters. The development and refinement of terminology and practices in curriculum management can be cited as a significant event in the emergence of emphasis on curriculum, especially in so far as vocational education is concerned. Curriculum management includes a broad scope of activity, i.e., curriculum development, diffusion, research, articulation, and utilization of educational technology in curriculum implementation.

The Curriculum Development Process

Curriculum development is a process. Furthermore, it may be described as a moving circular process in that the astute curriculum designer is constantly evaluating and feeding new information into the curriculum. Many phenomena outside of the curriculum have input into curricular change. Changes in agricultural practices have long been significant outside forces in changing the agricultural education curriculum. Legislation has produced curricular changes by altering funding procedures and expanding the purpose for which funds may be expended. Personnel responsible for the conduct of agricultural education programs have large impacts on curriculum through administrative procedures and policies of operation. Finally, the role of the instructional materials developer must be recognized as making significant contributions to curricular change.

Curriculum in agricultural education has largely been a local matter in that it was based on an analysis of the agricultural needs of the community served by a school. Simply stated, if there were a significant number of beef cattle in the community, the curriculum would include

instruction in various aspects of beef cattle production. In effect, the teacher in the local school was largely responsible for establishing the curriculum. Often, the teacher was provided with curriculum outlines or guides and various instructional materials to assist in planning. In recent years, the curriculum in agricultural education and the processes in developing it have become more complicated, due primarily to expansion of the program to include agribusiness and other non-farm agricultural areas. It appears that there has been a trend away from complete reliance on local planning to a state-wide, standard curriculum.

The current emphasis on developing the curriculum around competencies students need to achieve their occupational objectives is changing the curriculum and the process by which it is developed. Frykland in Occupational Analysis: Techniques and Procedures (1970) and Mager and Beach in Developing Vocational Instruction (1967) present procedures for task analysis and competency statement. Even though these procedures have a tremendous impact on the curriculum, the authors in both publications stop short of using the term curriculum. Instead, the terms instruction, teaching, and courses are used. Perhaps, these authors have chosen a very sound approach and one which does not negate curriculum planning on the basis of community needs for vocational and agricultural education.

In the curriculum development process, it is fundamentally sound for community characteristics to be used as the broad base for determining the scope of the curriculum. Once this broad base has been established, the details of the instruction can be formulated using curriculum guides and instructional materials and the results of competency studies. It is very important that the available curriculum guides be authentic and useable. It is the responsibility of the personnel developing the curriculum to ensure that the guides made available are valid and reliable. At this point the procedures employed in developing instructional materials become paramount. It is in this area of activity that state-level curriculum personnel must diligently strive to ensure that the materials developed are designed to provide maximum assistance to the teacher in establishing a responsible instructional program. Personnel in curriculum guide development must attempt to minimize bias. The question is "How?" The "how" is best accomplished by following a systematic procedure in the development of all instructional materials. (The procedure followed by the Agricultural Education faculty at Virginia Tech will be discussed later.)

Articulation-Diffusion

Instructional materials development activities are currently being conducted by educators at local, state, and national levels. National and state level inputs are to assist local education planners in developing relevant curricula. This involves vertical articulation-diffusion in the direction from a broad base of program management into specific local programs. Such vertical articulation-diffusion is reversed when local

programs have inputs into state and national curriculum management. In other words, vertical articulation-diffusion may move in two directions: from the local level to state and national levels and from national and state levels to the local level.

Just as vertical articulation-diffusion occurs within a program from one level to another, horizontal articulation-diffusion occurs from one area or program to another. Educators from different areas must jointly plan curriculum development activities. The concept of career education requires this type of planning and means that curriculum development projects must have built-in aspects of horizontal diffusion. Personnel in agricultural education and other vocational education and general education areas must have open lines of communication for horizontal articulation-diffusion to occur.

Instructional Materials Development in Agricultural Education
at Virginia Tech

Historical Perspective

Instructional materials development by the faculty in agricultural education at Virginia Tech has been underway since the 1920's, according to the best information available. A good example is the publication by H. W. Sanders entitled "Growing Corn for Grain: A Teacher's Manual ...," Department Mimeograph Number 12. This 50-page document was printed in 1929 and contains detailed lesson plans for high school agriculture teachers.

Through the 1930's, 40's, and 50's a variety of instructional materials was produced. These were widely used and have now largely been replaced with current materials. In the late 1960's and early 1970's a major effort was initiated to produce increased numbers of instructional materials. These materials were largely developed by the Agricultural Education staff with significant input from Supervisors of Agricultural Education with the State Department of Education, high school teachers of agriculture, students, and faculty in various technical areas in the College of Agriculture. Representatives of agriculture business and industry were also often involved in one way or another in the development of these materials.

Materials have been developed in varying formats and for different ultimate uses. Some of the materials were curriculum guides and were designed to assist the teacher in planning the agricultural education curriculum for a local school. Other materials were for use by teachers in instructing students and are commonly known as resource materials. A number of materials for specific purposes have been developed, one being a series of materials for use in conjunction with an educational television series. It is a common practice to refer to the documents produced as "instructional materials" without making distinction between curriculum guides, reference units, and similar kinds of material.

The impact of the instructional materials developed at Virginia Tech has been very pronounced on the curriculum in the high school agricultural education programs. No formal evaluations of the usage made of these materials have been conducted. However, a casual observation of the materials in the high school agricultural education departments reveals the use made of these materials in selecting, arranging, and sequencing learning experiences in agricultural education.

Developmental Procedures

A variety of approaches have been used in developing instructional materials at Virginia Tech. In general, the approaches can be placed into

a reasonably-definite procedural format. This format has been varied to meet the needs for materials as well as the capabilities of the personnel involved in the development activity. A typical procedural format used in developing the materials is presented below.

Determination of material needed. This is the first and most important step in any materials development activity. In Virginia, state-level curriculum committees established by the Agricultural Education Service in the State Department of Education are very important in establishing the priorities for materials development. These committees meet one or more times each year and are comprised of high school teachers of agriculture, supervisors of agricultural education, and teacher educators. Often, personnel outside of agricultural education participate with the committees in determining priorities for materials development. Included here are representatives of agribusiness and industry, employees of various governmental agencies, such as the Soil Conservation Service, Virginia Division of Forestry, and State Air Pollution Control Board, and specialists with the Cooperative Extension Service. The curriculum committees designate areas of need, if any, for instructional materials development. Priorities are derived from the areas of need listed and work is undertaken by the staff.

Preliminary planning. This is an important step in the early stages of instructional materials development. The areas of need as designated by the curriculum committees are refined so that the problem is clearly delineated. Time lines and deadline dates are established. Informal reading and study are made of the area as well as the identification of tentative persons qualified to provide technical assistance. The occupations involved are studied and, where possible, detailed competency listings are reviewed. In pre-planning, a committee is often established to serve in an advisory capacity to the materials developer. This committee, often on an informal basis, is for the purpose of reviewing and authenticating the materials as developed. Often, technical experts and teachers who will later use the material are involved. The procedure of pre-planning blends into the next step, information acquisition and analysis.

Information acquisition and analysis. This procedure is primarily one of obtaining all of the available resource materials pertaining to the area in which the instructional material is to be developed and organizing the materials for efficient use. In the case of areas where little has been written, this procedure requires considerable effort. This procedure is one of widely varying sophistication. A search is made in every possible location where resource materials may possibly be found, including searches of Abstracts of Instructional Materials (AIM) and Abstracts of Research Materials (ARM), contact with the State Representative for the National Network for Curriculum Coordination, review of previous editions of A Description and Source Listing of Curriculum Materials in Agricultural Education, (now known as New Instructional Materials for Agricultural Education), and review of readers' guides and

holdings in the Carol M. Newman Library at VPI & SU. As the materials are obtained and the review is begun, leads for further searching often become evident.

Early analysis of the resource materials is most important. This is important from the standpoint of the person developing the material acquiring a broad awareness of the scope of the area involved. It assists him in developing a tentative outline of the material and in being able to adequately discuss the area with technical authorities who are serving as resource persons. Analysis further involves studying the strategy required for carrying out the actual materials development phase and, possibly, revision of the time lines established during the pre-planning procedure.

Preparation of material. In materials-development work, this procedure is perhaps the most time consuming and requires the greatest precision. A tentative outline is prepared and reviewed by technical experts, teachers, and other appropriate persons, and placed in a more or less final form. (An outline is never final until the material being developed has been completed.) Depending on the kind of material being developed, e.g., a curriculum guide as contrasted with a reference unit, the manner of actually writing or otherwise preparing the material varies. It may involve some or all of the following: formulating objectives, selecting format for the material, sequencing technical content, writing technical content in an acceptable style and at an appropriate reading level, securing illustrations, developing supplementary materials and teaching aids, consulting with technical experts, utilizing the services of educational technologists, editing, and printing the first draft. Due to the many activities of wide variation in materials preparation, the developer often must work with artists, graphics specialists, typesetters, editors, proofreaders, photographers, and printers.

Refinement and field testing. Materials used for educational purposes must be accurate, capable of achieving the stated purpose of such materials, and appropriate for the intended audience. The primary activity of this procedure is authentication, an activity designed to insure accuracy and appropriateness. Materials are often reviewed by several technical experts and ultimate consumers of the material. This group (often known as an "authentication committee") may be convened in a formal session or used informally to review the first draft of the material and advise the developer on needed improvements. The first draft is then revised on the basis of input from this committee.

Another activity often included in this procedure is field testing of the material. One or more schools may field test portions or all of the revised first draft. Input from field testing is used to revise the material. Teachers in the schools used in field testing often receive specific instructions on their roles as persons involved in field testing activities.

Printing. The materials are printed and bound in an appropriate

manner, depending on the intended audience and amount of money budgeted for this particular title. The quantity printed depends on the kind of material as related to intended use. The number printed also includes extra copies for distribution to other agencies and outside the State.

Distribution-diffusion. This particular procedure involves getting the material into the hands of the intended users and training the intended users in how to utilize the material. The nature of this procedure varies with each individual materials development activity. Materials focusing on new technical areas or approaches to teaching require considerable emphasis on training the intended users. This training is often provided in workshops, conferences, and in-service graduate-level classes. Various resource persons may be utilized in the workshops. Related materials and aids may be displayed and reviewed with the teachers. It is the philosophy of the staff in the Agricultural Education Program at VPI & SU that distribution-diffusion is a very important aspect of materials development.

Appraisal and updating. Materials development does not end when the materials are placed in the hands of teachers. The staff is constantly observing the use being made of materials and receiving comments from the users. Evidence may be formally gathered in evaluating material usage. The purpose of securing feedback on material usage, reliability, and validity is to revise the material in a more acceptable and relevant form. A number of materials have been revised by the staff in agricultural education.

Instructional Materials Development - An Integral Activity of the Faculty in Agricultural Education

The Agricultural Education Program at VPI & SU is involved in three major functions: service, research, and instruction. The instructional materials development effort is primarily a service activity. Yet, the development of materials is not isolated from research and instruction. Instruction includes both pre-service and undergraduate teacher education and graduate-level study for masters and doctors degrees and the Certificate of Advanced Graduate Study. The research effort includes funded projects as well as the organized reports, theses, and dissertations of students.

Administratively, the Agricultural Education Program Area is one of eight Program Areas* in the Division of Vocational and Technical Education. There are four Divisions in the College of Education. The Agricultural Education Program Area has close ties to the College of Agriculture in that most of the technical courses taken by students majoring in Agricultural Education are offered by the College of Agriculture. The relationship with the Agricultural Education Service, Division of Vocational and Technical Education, State Department of Education, is extremely close and essential for proper conduct of Program Area functions.

Agricultural Education Faculty Responsibilities.

The responsibilities of the faculty in Agricultural Education are uniquely designed to ensure efficiency as well as the exchange of mutual concerns and professional competency. Six full-time faculty members currently comprise the Agricultural Education Program. Each has specific areas of responsibility as well as overall responsibility. These include a program leader, pre-service (undergraduate) education coordinator, graduate education coordinator, research coordinator, instructional materials coordinator, and agricultural mechanics specialist. Other than the program leader, the other positions designate function rather than title. The coordinators are responsible for keeping abreast of current activities in their areas of responsibility and coordinating work of the entire faculty in that particular area. The coordinators are by no means restricted to one particular area, but all are actively involved in instruction, research, and service.

Within the Division, the Vocational and Technical Education Curriculum Center (VTECC) functions to stimulate and coordinate curriculum

*The other program areas are: business education, distributive education, health occupations education, home economics education, industrial arts education, vocational-industrial education, and general vocational education.

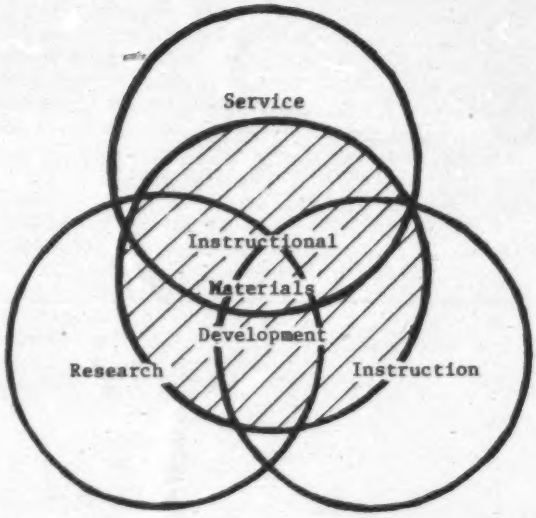

Figure 1. Organizational Structure of Agricultural Education Program Area for Instructional Materials Development. (Note that instructional materials development embraces the functions of research, service, and instruction.)

development activities among the faculty in the different Program Areas. This Center was established in 1973 and has a director responsible for its operation. The director of the VTECC is currently the representative for the State of Virginia with the National Curriculum Network and is a consultant in the conduct of all instructional materials development activities.

Supportive Structure for Instructional Materials Development

The faculty in the Agricultural Education Program Area has access to numerous supportive services in instructional materials development. A few of these are briefly described below.

College of Agriculture. The College of Agriculture is comprised of 15 departments, each with varied responsibilities in instruction, research, and service. These departments provide the Agricultural Education Faculty with considerable technical and professional expertise in many areas of agriculture. In addition, excellent facilities are available for preparing supportive materials and use in the distribution-diffusion procedure.

Learning Resources Center (LRC). The LRC supports the instructional, research, and extension programs of Virginia Polytechnic Institute and State University. Services are provided to all staff in the development of instructional strategies and multi-media materials. Services of the LRC are available to assist the faculty in instructional development, independent study facilities, television, media equipment, film library, graphic arts, and photography. A consultation service is available in instructional development and media to any faculty member.

Newman Library. The Carol M. Newman Library is the central reference facility serving staff and students at Virginia Polytechnic Institute and State University. This facility currently houses 820,000 volumes and is adding additional volumes at the rate of 80,000-100,000 per year. Periodicals, books, microforms, interlibrary loans, films, recordings, and other materials and services are available.

Self-Instruction-Curriculum Laboratory (SI-CL). This unit is operated in the College of Education with the primary function of supporting instruction in the College. Such support involves providing educational media and developing systems of delivery for instruction. SI-CL provides the Agricultural Education Faculty with technical assistance in designing different types of instructional materials.

Community Resource Development Office (CRD). The Community Resource Development Office is operated by the Extension Division of VPI & SU. This office has a staff which performs numerous functions in community development, including community recreation.

Vocational Education Evaluation Project (VEEP). VEEP is operated in the Division of Vocational and Technical Education and is to develop and implement a management information system for the State of Virginia in vocational education. It will provide the data needed in meeting local, state, and federal accountability requirements. The four primary objectives of VEEP are:

1. To develop a planning system which will include a computer-assisted system for gathering data on vocational education in Virginia.

2. To develop a system to upgrade planning and evaluation in the classroom.

3. To identify process and product variables and collect and analyze information on the effect of process variables on the product variables.

4. To develop a cost-effectiveness index which would supply information on the effectiveness of a vocational program for the resources expended on the program.

Vocational-Technical Education Consortium of States (V-TECS). Another area of work by the staff in the Division of Vocational and Technical Education is with the Vocational-Technical Education Consortium of States (V-TECS). This is a joint venture of nine states and the Southern Association of Colleges and Schools, Commission on Occupational Education Institutions. The primary purpose of VTECS is to generate catalogs of performance objectives and criterion-referenced measures in several occupational clusters.

Research Utilization Office. This office is operated in the Division of Vocational and Technical Education and is primarily concerned with the utilization of ERIC materials. Originally established as a project* in the Division, this office has the capability of providing searches of ERIC materials and other related education documents. The services of the Research Utilization Office are of considerable use in the preparation of materials. The objectives of the Research Utilization Office are:

1. To maintain a microform collection, indexes and other materials.

2. To provide both manual and computer searches.

3. To publish and distribute an ERIC Alert.

4. To provide copies of microfiche and abstracts.

5. To introduce Virginia vocational education personnel to the major vocational education dissemination system through seminars and other means.

*Name of the project is "Information Diffusion and Research Utilization in Vocational Education."

6. To assist local vocational education personnel to update curriculum materials.

7. To assist local vocational education personnel to identify pertinent research.

Office of Graduate Studies and Research. The Office is housed in the College of Education and has the primary responsibility for coordinating graduate study and research within the College. Services of this Office are used as needed by the Agricultural Education Faculty.

Publications Services. This office provides a variety of services including printing, art work, and editing. The printing facilities have equipment capable of handling a wide range of duplicating, collating, and binding needs. Most of the printed instructional materials developed by the Agricultural Education Faculty are processed through Publications Services.

Supportive Affiliations for Instructional Materials Development

The faculty in the Agricultural Education Program Area participates in a number of activities supportive of the instructional materials development function. Several of these are briefly discussed below.

Southern Agricultural Education Conference. The Southern Agricultural Education Conference is comprised of agricultural education personnel representing the states in the Southeastern area of the United States. The Instructional Materials Section of this Conference conducts several activities relating to materials development. In addition, it has a policy on the reciprocal exchange of materials by the various states. Materials developed in Virginia are automatically mailed to designated persons in the participating states. Likewise, materials developed in the other states are mailed to a designated representative in Virginia.

Workshop in Agricultural Mechanics Education. Annual workshops sponsored by the Southern Region Education Board are conducted for persons involved in agricultural mechanics instruction in the Southeastern United States. A primary function of the workshops in recent years has been the development of individualized learning packages. Virginia is normally represented by one or more persons.

Southern Region Research Conference in Agricultural Education. This conference is held annually to discuss areas of research pertinent to agricultural education. Reports of completed research projects are usually given and priorities in research are discussed. The research topics frequently have relevance in instructional materials development.

Curriculum Committee for Agricultural Education. This committee is in the Agricultural Education Division of the American Vocational Association and annually compiles and publishes a list of materials entitled New Instructional Materials for Agricultural Education. A faculty member in the Agricultural Education Program usually participates as a member of this committee.

Summary

Instructional materials development is a definite activity of the faculty in the Agricultural Education Program Area at VPI & SU. Beginning in the 1920's and continuing until the present date, the materials produced have been widely used and have made significant contributions to the development of high school programs of agricultural education in the State of Virginia. The current organizational structure of the Agricultural Education Program Area is very conducive to instructional materials development. The production of instructional materials is primarily a part of the service function. However, the functions of research and instruction contribute substantially to the instructional materials development effort. In practice, the instructional materials evolve from all three functions. This blend is deemed to present an ideal "mix."

The process used in materials development can be described in an eight-step procedural format, as follows:

1. Determination of material(s) needed.
2. Preliminary planning for developmental activities.
3. Information acquisition and analysis.
4. Preparation of first draft of material.
5. Refinement and field testing.
6. Printing.
7. Distribution-diffusion.
8. Appraisal and updating.

The faculty is located in a strategic position to utilize the supportive services of a major university. These services include personnel with considerable expertise in the various areas of agriculture as well as facilities for preparing a wide range of materials. The preparation of authentic materials, which are appropriate for educational use, can best be accomplished through the cooperative effort of teachers, state supervisory staff, and teacher educators in the Agricultural Education Program Area.

Appendix A

Current Staffing of the Agricultural Education Faculty

The Agricultural Education Faculty is comprised of six full-time and two half-time faculty members. These positions and the persons in them are briefly described below.

James P. Clouse, Program Leader and Professor, Agricultural Education, B.S., M.S., and Ph.D., Purdue University.

John R. Crunkilton, Associate Professor, Agricultural Education (coordinates undergraduate teacher education in Agricultural Education) B.S. and M.S., The Ohio State University, and Ph.D., Cornell University.

Martin B. McMillion, Associate Professor, Agricultural Education (coordinates research activities in Agricultural Education) B.S., University of West Virginia; M.S., The Pennsylvania State University; and Ed.D., University of Illinois.

Larry E. Miller, Assistant Professor, Agricultural Education (coordinates graduate program in Agricultural Education) B.S., University of Missouri-Columbia; M.S., Northwest Missouri State University; and Ph.D., Purdue University.

Jasper S. Lee, Associate Professor, Agricultural Education (coordinates curriculum materials development in Agricultural Education) B.S. and M.S., Mississippi State University and Ed.D., University of Illinois.

Robert A. Wall, Assistant Professor, Agricultural Education, B.S., and M.S., Virginia Polytechnic Institute and State University.

Charles Curry, Instructor, Agricultural Education, B.S., Virginia Polytechnic Institute and State University and M.S., Madison College.

Charles Tillman, Instructor, Agricultural Education, B.S., Alcorn State University and M.Ed., University of Indiana.

Appendix B

Recent Instructional Materials Development Activities (including selected research reports)

A list of instructional materials which have recently been developed and are currently available is presented below.

"Electricity: Calculating Electric Needs and Costs," Robert A. Wall, 1972, 8 pages--contains a summary of how to calculate electrical needs and costs.

"Electricity: Understanding Electricity & Electric Terms," Robert A. Wall, 1972, 8 pages--contains definitions of many common electrical terms and suggestions for teachers.

"Electricity: Planning and Installing Farm Wiring," Robert A. Wall, 1972, 8 pages--contains a summary of the content for planning wiring systems for farms.

"Electricity: Using Electric Control Devices," Robert A. Wall, 1972, 13 pages--contains a summary of the content on electrical controls and transparency masters.

"Electricity: Demonstrations for Electrical Teaching Center," Robert A. Wall and E. Steven Bell, 1972, 15 pages--contains sample demonstrations for using the electrical teaching center.

"Electricity: Selection, Care, and Operation of Electric Motors," Robert A. Wall, 1973, 12 pages--contains a summary of the content on electric motors.

"Rats and Their Control," Albert Carter, 1971, 15 pages--contains a lesson outline and summary of the content on control of rats.

"Controlling Damage Caused by Birds," Claire Nichols, 1971, 12 pages--contains a lesson outline and summary of the content on control of obnoxious birds.

"Control of Wildlife Pests," Albert Carter, 1971, 13 pages--contains a lesson outline and summary of the content in controlling wildlife pests.

"Effective Use of Drugs in Controlling Livestock Diseases," James Finney, 1971, 11 pages--contains a lesson outline and summary of the content in controlling livestock diseases with drugs.

"Agricultural Pesticides: Plant Diseases and Methods of Applying Pesticides," Albert Carter, 1971, 20 pages--contains a lesson outline and summary of the content in using pesticides on plants.

"Farm Management: Financial Planning--Capital and Credit," Charles Wootton, 1972, 18 pages--contains a lesson outline and summary of the content in the financial planning aspect of farm management.

"Estate Planning," Elmer Cooper, 1973, 70 pages--an instructional guide for teaching estate planning to adults.

"Instructional Manual for Continuing Education in Agriculture," Elmer Cooper, 1973, 161 pages--a complete guide to assist teachers of young farmers and adults in conducting programs on the local level.

"Agricultural Cooperatives Curriculum Materials for Agricultural Education," J. D. Oliver, 1969, 29 pages--contains a series of teaching outlines for use by agriculture teachers.

"Planning Guide for Establishing and Conducting the Agriculture Business Option," Glenn McCarty, 1973, 77 pages--a complete guide for teachers to use in conducting supervised agricultural experience programs.

"Securing and Succeeding on a Job," Glenn McCarty, 1973, 39 pages--contains lesson outlines for use by teachers in teaching how to secure and succeed on a job.

"Soils: Understanding the Nature & Importance of Soils," Claude E. Richard, 1970, 23 pages--contains a summary of the content for teaching the nature and importance of soils.

"Soils: Determining Land Capability Classes," Claude E. Richard, 1970, 11 pages--contains a summary of the content for teaching land capability classes.

"Soils: Preparing the Soil for Planting," Claude E. Richard, 1970, 10 pages--contains a summary of how to prepare a seedbed.

"Soils: Developing a Soil and Water Conservation Plan," Claude E. Richard, 1970, 13 pages--contains a lesson outline for use by agriculture teachers.

"Corn: Preparing for Planting and Planting Corn," Claude E. Richard, 1971, 26 pages--contains a summary of the content on planting corn and related transparency masters.

"Corn: Caring for the Growing Corn Crop," Claude E. Richard, 1971, 23 pages--contains a summary of how to grow corn.

"Corn: Harvesting, Storing and Marketing," Claude E. Richard, 1971, 14 pages--contains a summary of procedures for harvesting, storing and marketing corn.

"Soils: Testing Soil," Claude E. Richard, 1972, 16 pages--contains a summary of how to take good soil samples.

"Selecting and Buying Beef Cattle," B. C. Bass, 1971, 44 pages--contains a summary of the content for teaching how to select and buy beef cattle.

"Feeding and Caring for the Beef Breeding Herd," B. C. Bass, 1971, 40 pages--contains a summary of the content for teaching how to feed and care for beef cattle.

"Feeding and Caring for Growing and Finishing Beef Animals," B. C. Bass, 1971, 44 pages--contains a summary of the content for teaching how to feed and care for beef animals being finished.

"Preventing and Controlling Mastitis," B. C. Bass, 1971, 30 pages--contains an outline for teaching the prevention and control of mastitis.

"Preventing and Controlling Diseases and Parasites of Beef Cattle," B. C. Bass, 1972, 26 pages--contains an outline and content summary for teaching the prevention and control of diseases and parasites.

"Selected References for Teaching Animal Science," Larry Miller, 1973, 49 pages--contains a list of sources of instructional materials.

"Virginia FFA State Convention: Regulations and State Awards," C. S. McLearen, 1973, 60 pages--contains a summary of the regulations and awards for the FFA in Virginia.

The following publications were developed as part of a series of programs carried on Educational Television in Virginia. The series was designed so that local high school agriculture teachers could provide supplemental individual and group instruction. The titles are:

"Agricultural Chemicals, Pesticides: Need and Value of Pesticides" (1969).

"Agricultural Chemicals, Pesticides: Development of Pesticides"

"Agricultural Chemicals, Pesticides: Pesticide Regulations"

"Agricultural Chemicals, Pesticides: Identifying and Selecting Chemical Insecticides"

"Agricultural Chemicals, Pesticides: Selecting Non-Chemical Methods of Insect Control"

"Agricultural Chemicals, Pesticides: Resistance of Insects to Insecticides.

"Agricultural Chemicals, Pesticides: Control Practices for Insects"

"Agricultural Chemicals, Herbicides: Importance of Herbicides and Control Practices for Corn"

"Agricultural Chemicals, Herbicides: Methods of Weed Control and Control Practices for Forage Crops and Soybeans"

"Agricultural Chemicals, Herbicides: Selecting Herbicides and Control Practices for Lawns, Turf, and Tobacco"

"Agricultural Chemicals, Herbicides: Herbicide Application Equipment"

"Agricultural Chemicals, Herbicides: Control Practices for Small Grains, Gardens, and Specialty Areas"

"Agricultural Chemicals, Herbicides: Safety: Legal Considerations and Control Practices for Pastures and Peanuts"

"Ornamental Horticulture: A Curriculum Guide for Agricultural Education," Staff, 1969, 46 pages--contains an outline and guide for planning instruction in ornamental horticulture.

"Natural Resources Management: A Curriculum Guide for Agricultural Education," Staff, 1972, 57 pages--contains an outline and guide for planning instruction in natural resources management.

"Agricultural Production: A curricu um Guide for Agricultural Education, Staff, 1969, 14 pages--contains an outline and guide for planning instruction in agricultural production.

"Teaching the Disadvantaged," John R. Crunkilton, 1972, 32 pages--contains guidelines for assisting teachers of the disadvantaged in planning programs.

"Agricultural Business: A Curriculum Guide for Agricultural Education," Staff, 1969, 30 pages--contains an outline and guide for planning agribusiness instruction.

"Agricultural Machinery Service: A Curriculum Guide for Agricultural Education," Staff, 1969, 42 pages--contains an outline and guide for planning instruction in agricultural mechanics.

"Trade Journals and Magazines for Agriculture Related Occupations," Martin B. McMillion, 1973, 29 pages--contains a list and description of sources of journals and magazines for agriculturally related occupations.

"Parliamentary Procedure for Conducting Meetings," Chester S. McLearen, 1973, 32 pages--contains content for teaching parliamentary procedure.

"Developing Proficiency in Parliamentary Procedure," Chester S. McLearen, 1973, 9 pages--contains a description of procedures and parliamentary practices for agricultural teachers.

"Advanced Livestock Production: A Course of Study," Larry E. Miller, 1973, 343 pages--contains complete information for teaching livestock production, including outlines, objectives, teaching procedures, references, and transparency masters.

"Supervised Occupational Experience Programs," Larry E. Miller, 1973, 97 pages--contains lesson outlines for use by teachers in planning instruction in supervised experience programs.

"A Study of the Exploratory Agriculture Programs in Virginia," Larry E. Miller, 1973, 31 pages--contains a report of a study of exploratory agricultural programs in the public schools of Virginia.

"The Role of Supervising Teachers in Training Prospective Teachers of Vocational Agriculture," B. C. Bass, 1972, 22 pages--contains a report of a study to determine the behavioral activities in which agricultural education supervising teachers should engage.

"A Study to Determine the Use Made of Local Agricultural Advisory Councils in Virginia," John R. Crunkilton, Claude E. Richard, and Bobby R. Wright, 1972, 31 pages--contains the report of a study on the extent of use of advisory councils by local high school agricultural education teachers in Virginia.

"Unity and Coordination in Contemporary Vocational Education Programs: Proceedings of the Seminar for Leaders in Vocational Education," Edited by John R. Crunkilton, 1972, 101 pages--contains reports of presentations, discussions, and summary of the seminar.

"Competencies Needed by Teachers of High School Ornamental Horticulture Courses," B. C. Bass, 1970, 50 pages--contains a report of a study of the competencies needed teachers of ornamental horticulture at the high school level.

"The Vocational Education Needs of Montgomery County," John R. Crunkilton and Rod Chambers, 1970, 65 pages--contains a report of a study for planning and implementing vocational education programs in Montgomery County, Virginia.

"Summary Report of the Evaluation of the Halifax County Senior High School's Agricultural Education Department," John R. Crunkilton and Bobby R. Wright, 1972, 139 pages--contains a summary of an evaluation of the agricultural education program in the public schools of Halifax County, Virginia.

Series on Soil:

"What is Soil?" Larry E. Miller, 1974, 26 pages--contains lesson plans, lists of references and instructional aids, transparency masters, and related information on soils.

"Soil Water," Larry E. Miller, 1974, 33 pages--contains lesson plans, lists of references and instructional aids, transparency masters, and related information on soil water.

"Physical Features of Soil," Larry E. Miller, 1974, 38 pages--contains lesson plans, lists of references and instructional aids, transparency masters, and related information on soils.

"Chemical Features of Soil," Larry E. Miller, 1974, 40 pages--contains lesson plans, lists of references and instructional aids, transparency masters, and related information on features of soil.

"Soil Erosion," Larry E. Miller, 1974, 27 pages--contains lesson plans, lists of references and instructional aids, transparency masters and related information on soil erosion.

"Biological Features of Soil," Larry E. Miller, 1974, 9 pages--contains a lesson plan, lists of references and instructional aids, transparency masters, and related information of the biological features of soil.

"Student Injury and Teacher Liability," Elmer Cooper, Bill Dudley, and Glen McCarty, 1974, 39 pages--a self-instructional unit to assist teachers in understanding the legal aspects of student injury and teacher liability.

"Apiculture: Student Guide," Larry E. Miller, Editor, 1974, 176 pages--contains self-instructional materials on honey bees and apiary operations.

"Apiculture: Instructor's Guide," Larry E. Miller, editor, 1974 16 pages--contains information for the teacher to use in supplementing the student self-instructional publication on apiculture.

"Proceedings Twenty-third Annual Southern Region Research Conference in Agricultural Education," Jasper S. Lee, editor, 1974, 104 pages--contains summaries of the presentations and business meeting of the twenty-third research conference for the Southern Region.

"Exploring Agricultural Careers: The Importance of Work," Jasper S. Lee, 1975, 19 pages--contains information about the role and importance of work for use by teachers and students.

"Exploring Agricultural Careers: The Present World of Work," Jasper S. Lee, 1975, 35 pages--contains information on the nature of work, including changes in work, trends, labor unions, fringe benefits, and laws relating to work. It is designed for use by students and teachers.

"FFA Leadership Handbook," edited by Larry E. Miller, 1975, 80 pages--contains suggestions for providing leadership activities for FFA members and students in agricultural education.

"Food Preservation Manual: A Guide for School-Community Canneries," compiled and edited by Jasper S. Lee, 1975, 112 pages--contains information on the fundamentals of food preservation and cannery operation, details for canning specific food products, and sample lesson plans for teaching nutrition, meeting food needs, and food preservation.

"Undergraduate Advisement Manual in Agricultural Education," by Larry Miller, 1975, pages--contains a summary of the undergraduate and graduate degree requirements in agricultural education at VPI & SU, as well as other information useful to high school agriculture teachers and students at Virginia Tech.

"Selected References and Aids for Teaching Agricultural Mechanics," by April Mazzucco and edited by Larry Miller, 1975, pages--contains a list of sources of instructional materials for teaching agricultural mechanics.

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